A NEW SPECIES OF *APTERODON* (MAMMALIA, CREODONTA) FROM THE UPPER EOCENE QASR EL-SAGHA FORMATION OF EGYPT

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ABSTRACT

The mandible of a medium-sized carnivore discovered by a recent Yale paleontological expedition to the Fayum Province of Egypt represents a new species of the creodont *Apterodon*. The type and only specimen of this new species, *Apterodon saghensis*, comes from the Upper Eocene Qasr el-Sagha Formation and thus represents the earliest terrestrial carnivore yet described from the African continent. Unfortunately the specimen contributes little to our understanding of the origin and relationships of *Apterodon*.

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Introduction

From 1961 through 1967 a series of paleontological expeditions to the Fayum Province of Egypt was undertaken by Yale University field parties, and these expeditions have added considerably to our knowledge of the Paleogene mammalian faunas of Africa. The Oligocene faunas of the Jebel el-Qatrani Formation proved to be very rich and they have consequently received the most attention. Recent publications on these faunas include description of a new species of the primate *Parapithecus* (Simons, 1974), two new genera and species of carnivores (Simons and Gingerich, 1974), and a new genus and species of hyrax (Meyer, 1973). Detailed analysis of the sediments of the Jebel el-Qatrani Formation indicates that they were deposited on a low, featureless deltaic plain with gallery forests along the rivers and open savannah between (Bowen and Vondra, 1974).

Some attention was devoted to the underlying Qasr el-Sagha Formation by the Yale expedition. Study of the marine invertebrate fauna from this formation indicates that it is probably of late Bartonian age [ca. 40 million years (m.y.) B.P.] and correlative with the Mokattam and Maadi Formations of the Cairo region (Said, 1962, p. 102–103). Of particular interest is a fragmentary mammalian mandible found by one of us in an interbedded claystone, siltstone, and quartz sandstone facies of the Qasr el-Sagha Formation, which detailed sedimentary and stratigraphic analysis has indicated represents a prograding delta front (Vondra, 1974).

The new specimen, a very corroded mandibular ramus preserving the crowns of three teeth and parts of two others, is important as the first good record of a wholly terrestrial mammal from the Qasr el-Sagha Formation and the earliest confirmed record of a terrestrial carnivore from the African continent.

Abbreviations

CGM	Cairo Geological Museum, Cairo, Egypt
MNHN	Muséum National d'Histoire Naturelle, Paris, France
UCMP	Museum of Paleontology, University of California, Berkeley, California
UM	Museum of Paleontology, The University of Michigan, Ann Arbor, Michigan
YPM	Peabody Museum of Natural History, Yale University, New Haven, Connecticut

SYSTEMATICS

CLASS MAMMALIA
ORDER CREODONTA
FAMILY HYAENODONTIDAE
GENUS *Apterodon* Fischer, 1880

Apterodon Fischer, 1880, p. 288. Type species: *Aperodon gaudryi* Fischer.
Dasyurodon Andreae, 1887, p. 126. Type species: *Dasyurodon flonheimensis* Andreae.
Pterodon (in part), Andrews, 1904, p. 211.

INCLUDED SPECIES. *Apterodon gaudryi* Fischer, 1880; *A. flonheimensis* (Andreae, 1887); *A. macrognathus* (Andrews, 1904); *A. altidens* Schlosser, 1910; *A. saghensis* new species.

DISTRIBUTION. The type and only specimen of *Apterodon gaudryi* comes from the French Quercy Phosphorites of early or middle Oligocene age (ca. 32-37 m.y.) and *A. flonheimensis,* a possible synonym of *A. gaudryi,* comes from the middle Oligocene (ca. 32-34 m.y.) of Flonheim in the German Mainz Basin. *Apterodon macrognathus* and *A. altidens* both come from the lower fossil wood zone of the Jebel el-Qatrani Formation in Egypt (early to middle Oligocene, ca. 32-37 m.y.). *Apterodon saghensis,* described below, comes from the Egyptian Qasr el-Sagha Formation and extends the range of the genus into the late Eocene (ca. 40 m.y.) These approximate ages are based on Romer (1966, p. 335) and Berggren (1972, p. 198).

Apterodon saghensis, new species

Figures 1, 2, 3C

?*Apterodon* sp. nov., Simons, 1968, p. 15.

TYPE. CGM 40006, a left mandible with the root of the lower canine, the crowns of P_{2-4}, and the damaged crown of M_1. Sharp casts of the type specimen are deposited at Yale (YPM 30241) and the University of Michigan (UM 63389).

HYPODIGM. Type specimen only.

TYPE LOCALITY. The type specimen was collected in 1963 by E. L. Simons from a locality in the Fayum depression of Egypt some twenty feet above the

base of the deltaic sandstone facies of the Qasr el-Sagha Formation and approximately one-half mile north or northwest of the Qasr el-Sagha temple, near the road up the escarpment leading to the overlying lower fossil wood zone of the Jebel el-Qatrani Formation.

ETYMOLOGY. Named with reference to the specimen's provenance, from the Qasr el-Sagha Formation near the temple Qasr el-Sagha.

DIAGNOSIS. *Apterodon saghensis* differs from the species previously described in being significantly smaller (see Table 1), and in having a higher, straighter, and less robust fourth lower premolar (see Fig. 3).

TABLE 1. Tooth measurements of the type specimen of *Apterodon saghensis* and a comparison with the Fayum species *A. macrognathus* and *A. altidens* from the lower fossil wood zone. All measurements in millimeters. Mandibular depth measured beneath M_1.

	Apterodon saghensis CGM 40006	*Apterodon macrognathus* UCMP 62218	*Apterodon altidens* YPM 18160
P_2 L	8.5*	14.8	9.8*
W	4.2	8.3	5.7
P_3 L	10.7	15.8	–
W	4.7	8.5	–
P_4 L	12.0	18.7	15.1
W	5.9	8.9	7.1
M_1 L	9.5	13.4*	12.7
W	5.5	7.0*	6.4
Mandibular Depth	18.1	39.0	26.6

*estimated

DESCRIPTION. The type and only specimen of *Apterodon saghensis* is a left mandible fragment six centimeters in length. The bone is highly corroded, but a portion of the symphyseal surface remains on the medial side of the mandible. The front of the jaw is missing, and no trace remains of the incisors or their alveoli.

The crown of the lower canine is also missing, but its root is preserved and measures 9.7 mm by 7.1 mm in cross section. The mandible is damaged above and lateral to the canine root and the first premolar is missing, though it was undoubtedly retained in this species.

The crowns of three premolors, P_{2-4}, are well preserved. P_2 has a single blunt protoconid cusp, with cristids extending anteriorly and posteriorly from

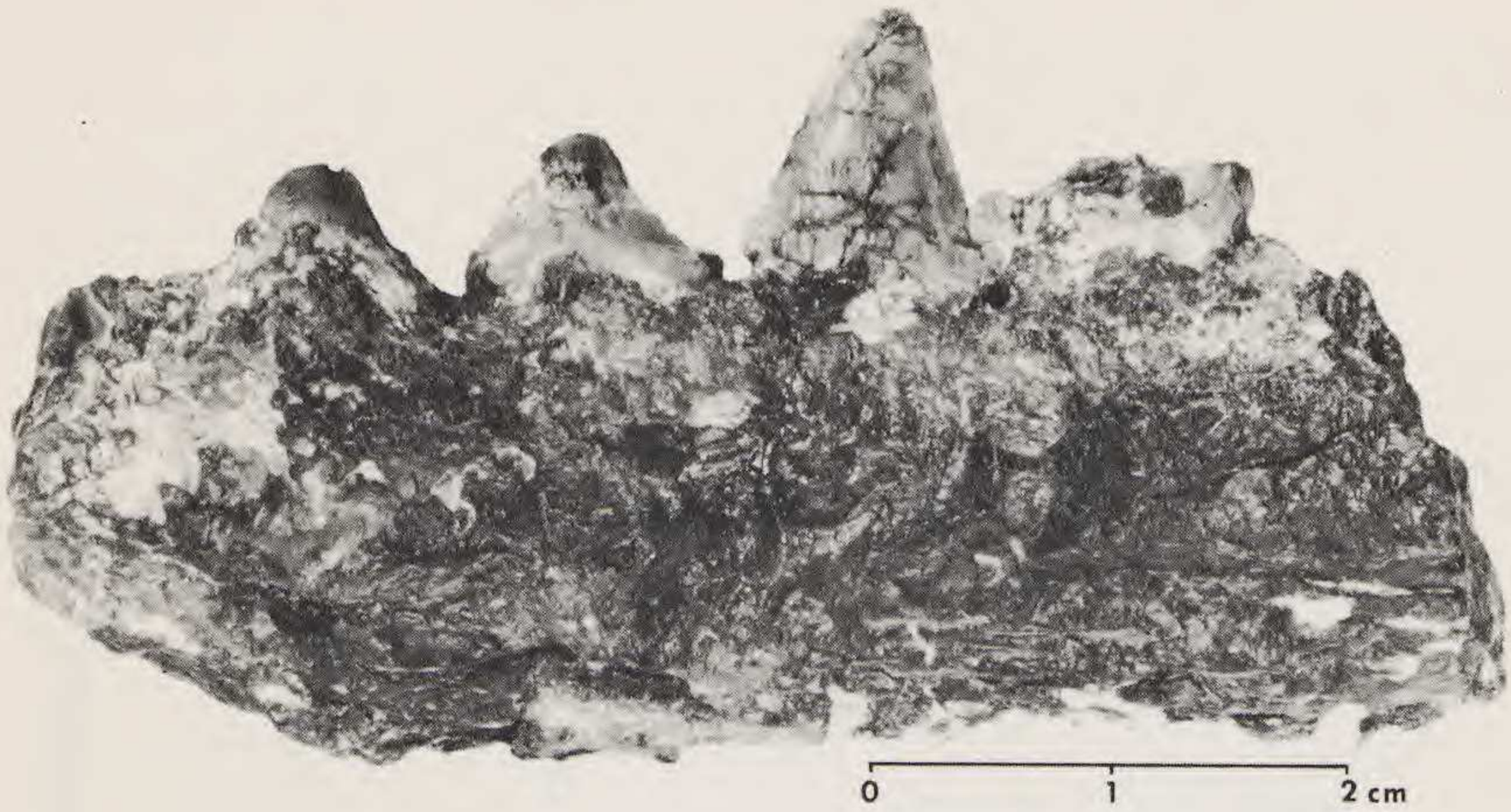

FIG. 1. Lateral view of type specimen of *Apterodon saghensis*, CGM 40006, showing the root of the lower canine, and P_2–M_1. Note the badly corroded mandibular bone.

the protoconid. A very weak cingulid is present on the buccal side of the crown, and a slightly more prominent cristid is developed at the anterolingual corner. The posterior portion is damaged slightly, but the crown length was approximately 8.5 mm. The width of the crown of P_2 is 4.2 mm. P_3 is slightly larger, but is otherwise very simliar in morphology to P_2. P_3 measures 10.7 mm in length, and 4.7 mm in width. A portion of the lingual cingulid is missing, but this shelf broadens posteriorly making a very shallowly basined heel medial to the posterior cristid from the protoconid. P_2 and P_3 both lack any accessory cusps.

The lower fourth premolar is very well preserved, apart from an anteroposterior split in the enamel of the protoconid predating mineralization of the specimen. The protoconid is the dominant cusp on the tooth, and it is relatively high and straight (see Figure 3). A cristid runs down the anterior surface of the protoconid, connecting with a small but distinct anterior basal cusp or paraconid. The posterior cristid of the protoconid joins the posterior basal cusp (which is apparently serially homologous with the hypoconid of a typical molar) in a distinct notch toward the back of the crown. A strong lingual cingulid connects the anterior and posterior basal cusps, and a very weak cingulid is developed on the buccal margin of the tooth. The crown of P_4 measures 12.0 mm in length and 5.9 mm in width. Just as on P_{2-3}, the enamel on this crown appears to be very slightly crenulated.

The protoconid of M_1 appears possibly to have had a straighter posterior margin than is typical in *Apterodon*, which suggests that perhaps a small

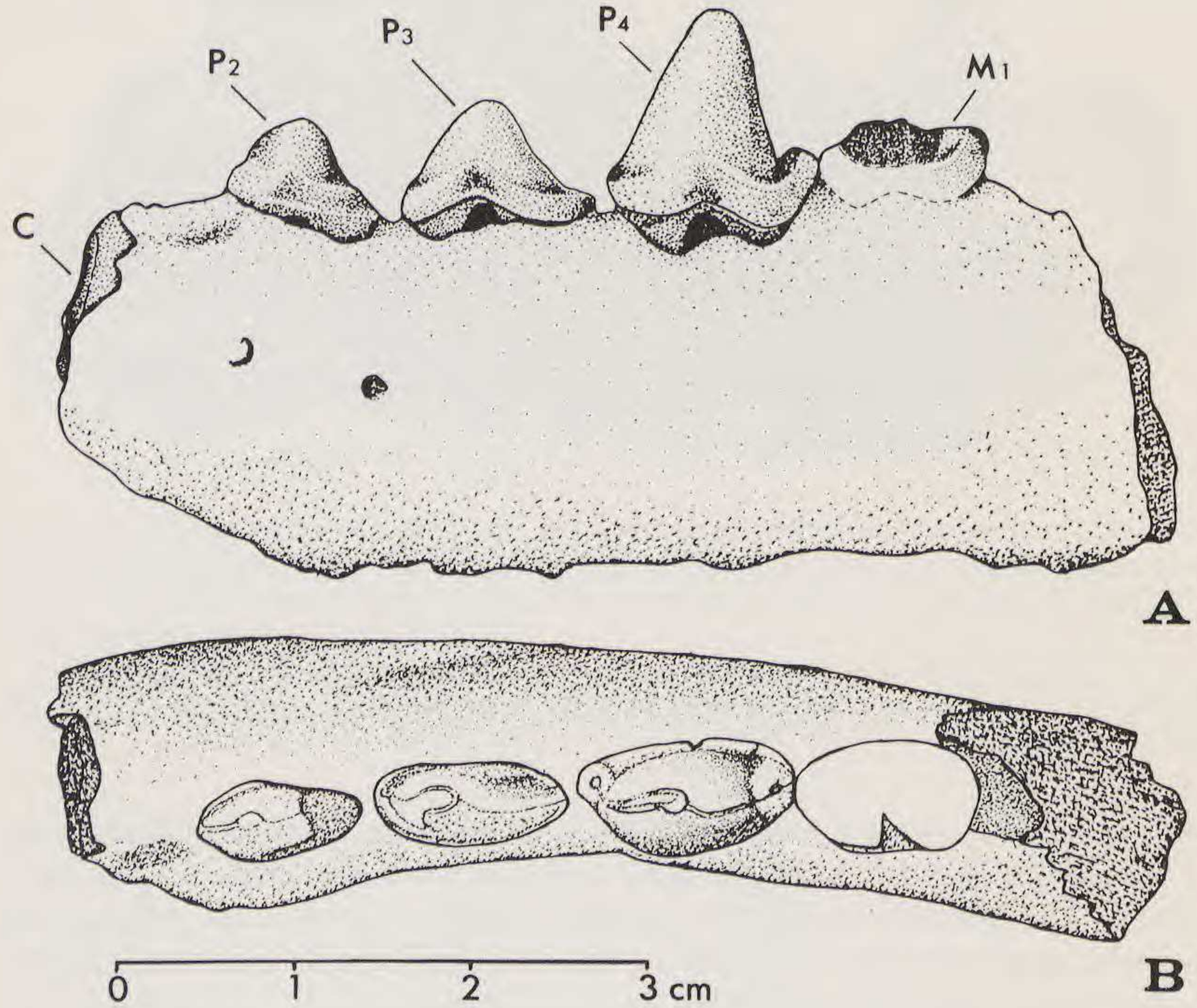

FIG. 2. Type specimen of *Apterodon saghensis* in lateral (*A*) and occlusal (*B*) view, showing the root of the lower canine (*C*), lower premolars (P_{2-4}), and the first lower molar (M_1).

metaconid was retained, but the crown of this tooth is too damaged to offer any positive evidence of this. A distinct constriction separating the trigonid of the tooth from the talonid is apparent, and a buccal cingulid is weakly developed. The tooth is too poorly preserved to show any other details. M_1 measures approximately 9.5 mm in length and 5.5 mm in width. The mandible is broken behind M_1, and no trace of M_2 or M_3 remains.

Discussion

Species of *Apterodon* are the most common carnivores found in the Oligocene Jebel el-Qatrani Formation of the Fayum, and the specimen described here indicates that species of this genus were probably common in the Late Eocene as well. The abundance of *Apterodon* in Egyptian deposits and its

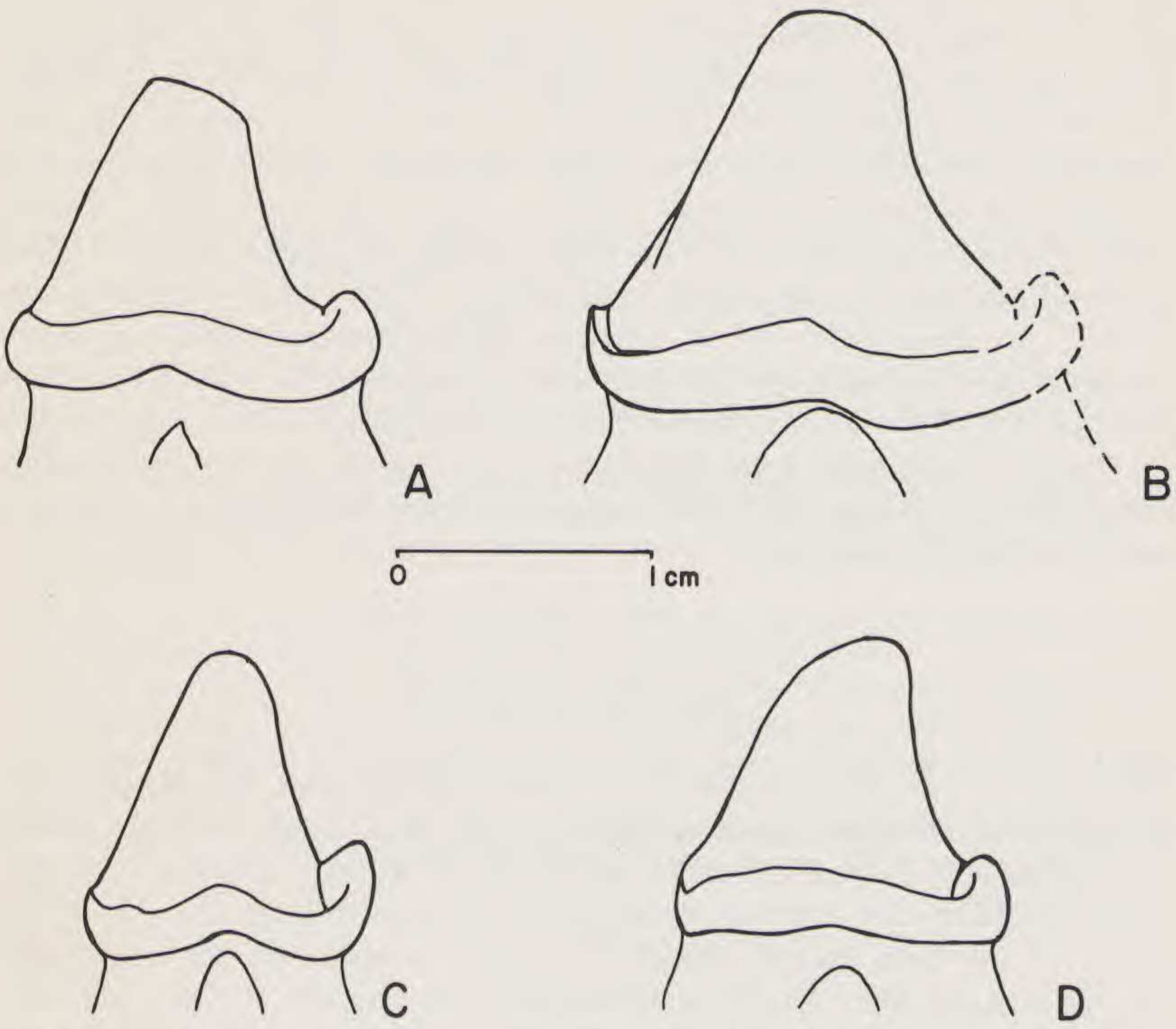

FIG. 3. Comparison of the lower fourth premolar of four species of *Apterodon*. *A, Apterodon altidens* from the Fayum lower fossil wood zone, Jebel el-Qatrani Formation (YPM 18160). *B, Apterodon macrognathus* from the Fayum lower fossil wood zone, Jebel el-Qatrani Formation (YPM 18165, reversed). *C, Apterodon saghensis* from the Fayum, Qasr el-Sagha Formation (CGM 40006). *D, Apterodon gaudryi* from the French Quercy Phosphorites (from a cast of the type, MNHN).

rarity elsewhere (the two European species are known from a single specimen each) suggests that *Apterodon* probably evolved in isolation in Africa, with the exception of a limited migration around the Tethyan Sea resulting in a minor invasion of Europe in the early Oligocene.

Unfortunately, only one other carnivore specimen possibly equal in age to *Apterodon saghensis* is known from Africa, a fragmentary specimen of a "hyaenodont" mentioned by Savage (1969) from Dor el Talha in southern Libya. Neither specimen contributes significantly to understanding the origin

and relationships of *Apterodon*. In his original description of *Apterodon*, Fischer (1880) recognized its similarities to *Pterodon*. Andrews (1904) at first placed *Apterodon macrognathus* in *Pterodon*. In describing the first skulls of the genus, Osborn (1909) retained *Apterodon* in the Hyaenodontidae. However, the long-supported relationship of *Apterodon* to *Pterodon* and the Hyaenodontidae was questioned by Van Valen (1966, p. 85), who proposed transferring *Apterodon* to the condylarth family Mesonychidae, a suggestion followed by Romer (1966, p. 385). Szalay (1967) disputed many of the points raised by Van Valen. Szalay concluded that as a result of his discussion "the undoubted hyaenodontid affinity of *Apterodon* is confirmed." In the absence of an adequate Eocene fossil record, we follow Lange (1967) in regarding any definitive phylogenetic or systematic placement of *Apterodon* as premature. It seems preferable to retain provisionally for *Apterodon* the place it has long occupied among the creodont Hyaenodontidae; however, if and when true mesonychids are discovered in Africa the question might be reopened.

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